PROJECTIONS OF LITHUANIAN RIVER RUNOFF IN 21st CENTURY

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Introduction. River runoff is projected to increase in some regions and to decrease in others depending from different climatic and geographical conditions. On purpose to evaluate runoff changes are forecasted by modelling of hydrological processes according to different climate scenarios. Projected changes of runoff are described by many scientists. In Nordic and Baltic countries analysis of projections of rivers runoff show the redistribution of runoff throughout the year: a significant increase of winter discharge and a tendency for decreasing spring floods. Furthermore, new climate scenarios presented in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) give opportunities to evaluate the river runoff changes more exactly.

The aim of the present research is to assess the climate change impact of Lithuanian rivers runoff according to different climate change scenarios.

Data and methodology. Projections of runoff were calculated for the Nemunas river. Daily discharges of 10 water gauging stations, daily precipitation and air temperature data of 14 meteorological stations were used to create the Nemunas hydrological model. Climate change impact on hydrological processes in the largest Nemunas river basin of Lithuania has been estimated through combination of results from A1B, A2 and B1 emission scenarios and global climate models **(**ECHAM5 and HadCM3). These climate scenarios were used as input data for HBV hydrological model. Projections of river runoff were calculated for the periods of 2011-2040, 2041-2070 and 2071-2100. These results were compared with baseline period of 1961-1990.

Results. The modelling of the Nemunas river runoff according to six climate scenarios for all periods has been done. The results of calculation show a decrease of the annual Nemunas river runoff. The biggest changes were detected in winter and spring seasons (Fig. 1). In the periods of 2011–2040, 2041–2070 and 2071–2100, the runoff will increase from 16 to 37% in winter season and decrease from 33 to 43% in spring season comparing with baseline period. Less increasing of runoff will be in summer season (12 – 23%). There will be insignificant changes of runoff in autumn season during all periods. According to all emission scenarios, the strongest increase of runoff will happen in February. River discharges of the spring season will mostly decrease in April.

Conclusions. Forecasting of the Nemunas river runoff has been done using the HBV hydrological model. According to all emission scenarios, the river runoff has to increase in winter season, because high temperatures determinate runoff increasing (decrease snow possibility and thickness of the snow cover). Spring runoff has to decrease, because spring floods move to the winter season. The runoff will have tendencies to increase in the summer. The Nemunas river runoff is going to be more smoothed during a year.

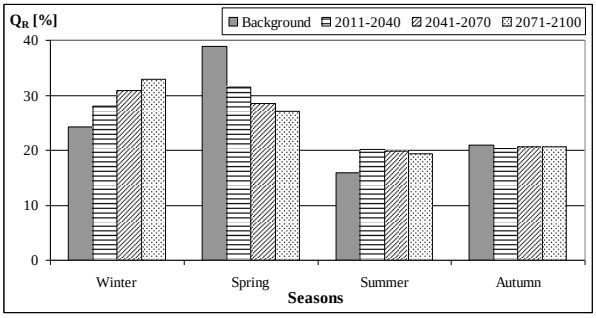

Figure **1. –** *Changes of Nemunas river runoff during different seasons according to six emission scenarios (% from the annual amount)*